National Youth Team Football Players between the Conflicting Priorities of Sports Success and Vocational Training

Abstract

In view of the risks involved in relying on a professional career in football as a way of making a future living, most players on Swiss National Youth Football Teams pursue some form of vocational training at the same time. This paper investigates the question under what conditions a successful football career is possible when faced with such a dual burden. In order to examine the development process as holistically as possible, a person-oriented approach was chosen. 159 former Swiss National Youth Team players were retrospectively interviewed about their careers, and the data were analysed using the LICUR method (Bergman, Magnusson, & El-Khouri, 2003). This involves identifying certain patterns in the relevant variables of sports career, vocational career and family support, and then comparing these with the performance at the age of peak performance. Through this, it was possible to identify promising patterns of development. It turns out that the critical transition, at the age of about 15–16 years, is characterised overall by stability. The most successful patterns display above-average family support accompanied by above-average professional talent promotion in the clubs. In this constellation, the football players who are later successful pursue vocational training courses leading to low levels of educational qualification.

Keywords: Football careers, talent research, person-orientation, LICUR method

Introduction

The process of promoting young talents can be described as a cyclical sequence of identification, selection and development (Williams & Reilly, 2000). The corresponding structures for promoting players are pyramidal so that the number of young talents supported decreases with increasing age. This type of system means that over the years prospective talents are constantly being removed from the process through de-selection (Güllich & Emrich, 2006). Due to this system, only a small percentage of the once hopeful talents eventually make it to the top. In terms of securing one's future livelihood, the vocational choice of becoming a "top-class athlete" therefore bears considerable risks. As a result – in Switzerland, at least – young sports talents generally undergo vocational training as well as sports training, even in those sports in which a professional infrastructure is in place, so that if they do drop out of competitive sports, they have a profession that will allow them to earn a livelihood. However, the resulting dual burden places the young athlete before major challenges and can become an insurmountable obstacle to talent development (Weisbarth & Henkel, 2011). The young athletes face a massive dilemma: in order to assert themselves against their competitors, and therefore continue to receive support, they must utilise sizeable resources for their continued athletic development. On the other hand, they need to fulfil the minimum requirements of a vocational training course, which also makes demands on their resources. This raises the question whether, and under what conditions, a successful sports career can be reconciled with a vocational training qualification. Since successfully completing one's sports and vocational training may be assumed to require a high level of support from one's environment, particularly one's family (cf. for example Bailey et al., 2010; Baker, Horton, Robertson-Wilson, & Wall, 2003; Côté, 1999; Reilly, Williams, & Richardson, 2008), the paper in hand will examine the interaction between these three areas of life: one's athletic and vocational career, and one's familial support. This type of holistic analysis of the development process within these three areas of life meets the demand for multidimensional and dynamic approaches in talent research that has until now scarcely been implemented empirically (cf. for example Abbott, Button, Pepping, & Collins, 2005).

Our study of football players who have at some time in the past been members of the Swiss National Youth Team will examine which circumstances favour coping with the dual burden of a competitive sports career and a vocational career, in terms of subsequent athletic success.

Theoretical foundations

Demands of the athletic career

The promotion of football as a competitive sport begins at a very early age. It is quite common for clubs that play in the top leagues to have teams of promising talents at the U12 level or even younger. As a rule, young players are selected once a year for the next highest level. Step by step, the training structures are intensified and professionalised. By the age of about 15, a distinct focus on professionalization is already observable. If a player is aiming to play football at a top level on reaching adulthood, his commitment to competitive sports must be consolidated by this age. During this phase, training, which has until then largely focused on the playful aspect of the game, undergoes a pronounced professionalization, primarily expressed by an increase in the volume of training. The performance orientation also changes the nature of the training, which now teaches contents relevant to specific positions and targets the player's individual deficits. In addition, the training of stamina-related skills is initiated and intensified. The sports environment (club, coach, infrastructure) becomes more important. The sport becomes a more central part of the athlete's life; all other areas of life are ultimately subordinated to sports training (Salmela, 1994). In order to describe the development process, sport scientific talent research has tried to distinguish between different stages of development. Bloom (1985) describes the comparatively general *early*, *middle* and *later* years, which were later specified more precisely in terms of the demands of the professional sport (Côté, 1999). The paper in hand will adopt the terminology used by Salmela (1994), who describes an *Initiation*, *Development* and *Mastery* phase. These phase concepts will be discussed critically, particularly in that they ignore differences in the individual developmental processes (cf. for example Bailey et al., 2010; Gulbin, Weissensteiner, Oldenziel, & Gagné, 2013). In adopting the terminology used by Salmela (1994), the present paper is primarily concerned with naming the phases before and after the transition

at the age of approx. 15–16 years described above, corresponding to the Development und Mastery phases (Salmela, 1994).

The fact that this transition at the age of approx. 15–16 years is an important one in football is also reflected by the infrastructure of the system for developing talents: national selection begins at the U15 level, and international junior championships are held soon afterwards, from the U17 level on. The step into national team structures is an expression of the onset of the Mastery phase, which is associated with participating in international championships. All in all, therefore, an increasing performance orientation and professionalization is apparent in the development process, which makes extremely high demands on the players' resources up until the Mastery phase. Without focusing on their athletic career, they can no longer fulfil the demands made of them.

Demands of the vocational career

In Switzerland, education begins with nine compulsory years of school, generally between the ages of 6 and 15. Depending on the level of lower secondary education attained (7th to 9th form), school pupils have various options at the subsequent higher secondary level: Gymnasium (grammar school), Fachmittelschule (specialised middle school), vocational training at a vocational college, or a tenth school year. The transition from lower to higher secondary education usually occurs after a long-term selection which is influenced by various factors. These include individual skills and interests, school performance, restrictions imposed by the immediate surroundings (e.g. ease of access to training facilities, financial circumstances of parents) as well as the future vocational and financial opportunities offered by the course in question.

In the case of young sports talents, there is a further key criterion: the opportunities for coordinating one's involvement in competitive sports with one's vocational training (Borggrefe & Cachay, 2012; Brettschneider & Heim, 2001). These factors that influence the choice of a profession are associated with various target conflicts. On the one hand, higher educational institutions (Gymnasium and Fachmittelschule) offer a more flexible educational programme and therefore allow the school and sports careers to be reconciled with each other more effectively than other vocational training options. On the other hand, though, these educational options are associated with certain

minimum cognitive requirements. This means that the cognitive skills of the young sports talents are relevant in two different senses: on the one hand, pupils with a poor cognitive performance have difficulty gaining access to higher-level educational institutions, on the other hand, players with higher cognitive skills need to invest less effort in order to meet the demands of their school education, which has a positive effect on their overall workload. However, the higher educational offers usually take the form of school educational programmes, which are as a rule followed by university studies. This means that young talented athletes who choose this path finish up at the end of secondary school with the necessary qualifications for university training, but without any vocational qualifications.

Weighing up these factors is difficult and puts considerable, possibly even excessive, demands on young people at the age of about 15–16 years (Brettschneider & Heim, 2001). Their decision has a huge influence on the conditions during the next stage of their lives, and must therefore be weighed up very carefully and take into account the adolescent's individual skills and resources. The athlete's immediate surroundings – primarily his family – accompany the entire process and are, as a rule, his most important source of support (Alfermann, Saborowski, & Würth, 2002; Kreutzer, 2006; Richartz, 2000; Weber, 2003; Würth, 2001).

Family support

The family from which a person comes plays an important part from the start of an athletic career right through to adulthood. Up until the transition from the Development to the Mastery phase, parents are a key source of support on many different levels, e.g. in emotional, financial and organisational terms (cf. for example Bailey et al., 2010; Johnson, 2006; Salmela, 1994). As a rule, the parents' influence decreases from the age of 16 (Mastery phase) onwards (Alfermann et al., 2002). Ultimately, professionalization means that certain tasks in the sports sector that used to be performed by the parents are taken over by the club or the coach and in some cases also by a manager or career counsellor.

Without parental support, successful careers appear to be difficult to achieve (Richartz, 2000; Weber, 2003). There is a fine line defining what constitutes constructive support, in that a (too) pronounced commitment on the part of the parents can be perceived by the athlete as a form of

pressure (cf. for example Lee & McLean, 1997; Würth, Lee, & Alfermann, 2004). With the increasing success of their child, parents may develop expectations towards the future course of his athletic career. Such expectations are fuelled by developments in the field of football over the past 10 to 20 years, during which clubs have been signing financially lucrative contracts with increasingly young players. In terms of vocational career development, too, parents have certain expectations towards their children, depending on the family's socio-economic status (Hurrelmann, 2006). The resulting pressure from these expectations on the part of their parents can inhibit the players' athletic development (Würth et al., 2004). The player's own perception and interpretation are therefore crucial when assessing the support provided by his family.

Interaction between the different careers

The sports career, educational-vocational career and family career are reciprocally related to each other. Developments in one area of life influence the other areas too (cf. Mayer, 2009). A person's life course can therefore be described as a multidimensional process. The contingency of the life courses arises from the interdependency of the different areas of life (Blossfeld & Huinink, 2001). In the field of competitive sports, such interdependencies are displayed very clearly: the choice of profession has a considerable influence on whether the chosen profession can be reconciled with a career in competitive sports; and the social environment, primarily the family, supports both the athletic and the vocational career. The interdependency of the various careers becomes particularly clear during the transitions between two phases. The athlete is under a particularly high strain during such transition periods, since the external conditions change drastically (Abbott et al., 2005; Stambulova, Alfermann, Statler, & Côté, 2009; Wylleman, Theeboom, & Lavallee, 2004). Different areas of life can be affected by this, and the changes can have far-reaching consequences, for example when the location of the school or training facility changes.

Looking at the reconcilability of a school career and a vocational career in football, the transition by the age of approximately 15–16 years (from the Development to the Mastery phase) is of particular interest since this is a time when the demands in both areas of life change radically (Bailey et al., 2010). Key decisions regarding one's choice of profession occur at the same time as the onset of

committing oneself to competitive sports (Richartz & Brettschneider, 1996). The decisions made during this transition period are crucial to the individual's further sports career. The basic framework for the next three to four years is determined at the age of about 15 or 16.

The description of the demands of the different areas of life accentuates the ecological factors of the development process. The resulting socialisation-theoretical perspective focuses on a person's relevant short-term and longer-term environmental systems (Bronfenbrenner, 1979). In looking at how talents develop in football, the focus lies on the individual player. The individual represents the starting point, and one investigates how a player is able to develop in his specific surroundings. In doing so, a dynamic, interactionist approach is assumed, according to which human development occurs as a result of various reciprocal interactions between a person and his or her environment, as well as within the person and within the environment. Since the person and his or her environment are constantly interacting dynamically, this phenomenon is described as dynamic interaction (Magnusson, 1990; in sports science, Conzelmann, 2001). The environment and its conditions influence the person and his or her actions, while conversely individual may influence their environment through their choices and actions. This perspective of the interdependence of different areas of life and their dynamic interaction is based on a holistic interpretation of human development, which leads to a person-oriented approach when conceptualising the empirical study.

Talent development from a person-oriented perspective

The description and analysis of individual characteristics or variables from a single area of life would not do justice to the theoretically postulated dynamic interaction between a person and his or her environment. Variable-centred approaches like this are limited in various respects. On the one hand, it does not seem plausible that individual characteristics should on their own be able to describe or explain the complex process of development; and on the other hand, such approaches do not take interactions, nor the potential for compensating between different variables, sufficiently into account. In talent research, too, complex talent definitions have recently been favoured, which take into account on the one hand the exogenous conditions under which development occurs (Bailey et al., 2010; Vaeyens, Lenoir, Williams, & Philippaerts, 2008), and on the other hand the development of the

individual over a specific period of time (Abbott et al., 2005; Abbott & Collins, 2002; Gulbin et al., 2013; Reilly et al., 2008). However, most of the empirical studies conducted to date have failed to adequately implement these far-reaching theoretical demands. In other words, although the integration of developmental scientific concepts into this research field seems to suggest itself, it has until now rarely been implemented (cf. Zibung & Conzelmann, 2013).

For the conceptualisation of modern development science, Magnusson and Cairns (1996) assume a holistic perspective of human development, on top of the dynamic, interactionist viewpoint, which leads to a person-oriented approach (Bergman & Magnusson, 1997). This approach would also seem to be an appropriate way of dealing with questions about talent development in sports, since it is able to describe the development process of a person within his or her surroundings.

The person-oriented approach makes two basic assumptions (Bergman, Magnusson, & El-Khouri, 2003): firstly, an individual develops as a complete and integrative organism. Hence the focus of interest is the person as a whole rather than individual features of that person. Secondly, an individual develops as an active being in a higher-order, integrated person-environment system. This implements the system concept, and for systemic development models two additional conditions are imposed: firstly, biological systems have a tendency towards self-organisation and self-optimisation, as a result of which the individual factors of the system always tend to maximise their contribution to the overall system. Secondly, it is assumed that only a limited number of constellations is optimal and therefore leads to a stable system (Bergman & El-Khouri, 2003). The assumption of systemic development means that it is no longer possible to assume linear relationships, the methodological consequence of which is that it is necessary to dispense with procedures based on the *General Linear Model* (GLM).

The theoretical considerations presented imply that the person-environment system must be recorded and analysed holistically. Though desirable in theoretical terms, this holistic view cannot, however, be fully implemented in an empirical study. Therefore, in order to reduce the complexity of the overall person-environment system, in the interest of methodological implementability, the overall system has to be structured in the form of various subsystems, each of which makes its own

contribution to the overall system. The topic of research interest may therefore be confined to a subsystem and thus to the interactions between those features involved in the subsystem. In view of the interdependencies, possible compensation mechanisms exist between different features of development, which can be represented using person-oriented analytical tools. The interacting variables of a (sub-)system are known as operating factors (Bergman et al., 2003). Although the introduction of subsystems means making certain trade-offs in the theoretically presented person-oriented perspective for the sake of its empirical implementation, the idea of representing a (sub-) system through its operating factors and their possible mechanisms for mutual compensation remains, offering an additional benefit compared with variable-centred approaches.

The operating factors of a person-oriented approach do not necessarily differ from the variables studied in variable-oriented studies. For example, the property of “school performance” can be related to a dependent variable as an individual, independent variable, as well as serving as an operating factor in a person-oriented approach. The crucial difference in a person-oriented approach lies in the fact that several variables are viewed as a system and different constellations of such systems are represented as patterns. These patterns are a result of the “organisation” of the operating factors. Since individuals develop differently, differences between individuals can be identified, among other things, via differences in the way the operating factors (=patterns) are organised (Bergman et al., 2003). The empirical analysis on the one hand studies the observable patterns themselves, and on the other hand examines the sequence of patterns in the course of development. Hence individual factors are not assumed to be connected in a linear fashion with a particular performance criterion, in this case with adult performance in football.

In empirical terms, only a manageable number of particularly frequent patterns (so-called *common types*) can be observed, because in view of the second condition for systemic development models, only a limited number of conditions will be optimal for the overall system (Bergman & El-Khouri, 2003). From a theoretical point of view, however, other, non-observable patterns can also be envisaged. These so-called *white spots* (Bergman & El-Khouri, 2003) are important for understanding development theories and continuing to refine them. Based on the concept of such white spots,

individuals with unique patterns deserve special attention, since they are situated on the boundaries between the white spots and the empirically observable patterns. Such unique or extreme cases are known as *residues* and treated separately in the data analysis. Particularly in the field of talent development, unique patterns can contribute crucially to understanding the development process, since a particular excellence in performance can presumably only be explained by means of a unique development process (a current example in the field of football would be Lionel Messi).

The present research

The aim of the present study is to holistically map athletic, vocational and family careers, and the interaction between them, in the case of (former) Swiss Nation Youth Team football players, using a person-oriented approach and focusing on the time of the critical transition from the Development to the Mastery phase (between the ages 13 and 18). First, patterns of the operating factors of the three parallel careers will be established in order to describe the state of the system in the two phases. In addition, the stability of these patterns will be examined. Two types of stability need to be distinguished. If the patterns remain stable on a group level (structural stability; Bergman et al., 2003), then the same patterns can be identified at different points in time. If certain courses of development are more frequent on an individual level than predicted by chance, (individual stability; Bergman et al., 2003), then these are described as developmental types. If these types are in addition associated with success in sports, they would appear to be particularly promising developmental patterns. Our analysis will therefore be guided by the following questions:

1. Which patterns can be identified in former National Youth Team players in terms of the three parallel careers competitive sports, vocational training and family in the Development and Mastery phase, respectively?
2. Are the same patterns seen in both phases (structural stability)?
3. What developmental paths are followed by the former National Youth Team players between the two phases (individual stability)?

4. Are certain patterns associated with a particularly high level of sports success in adulthood?

5. What patterns of residues reach a high level of performance in adulthood?

The study is therefore explorative in nature, and while uncovering patterns does not claim to explain them.

Method

Sample and data collection

Expertise research (Ericsson, 1996) is an economical way of collecting data covering long periods of development. In it, individual career paths are reconstructed in order to obtain insights into relevant factors for a successful career. The study in hand also follows this principle. The sample includes the data of former players from the U16-U21 national football teams, born between 1981 and 1987, who were asked at least once to play for a national youth team (the population was N=346, of which n=159 were ultimately included in the analysis). This "partial expertise" in adolescence is far from being a guarantee for later expertise at the age of peak performance. The heterogeneity of adult performance (from players on Switzerland's National Team A, through to players who ended their careers at an early age) allows connections to be identified between the long-term career course and the level of performance actually achieved in adulthood. The players were divided up into four levels of adult performance, using the criteria *Level of current team at the age of 22* (22 was the age of the youngest cohort at the time of measurement) and *Number of games played for the national U19 to U21 youth teams* (cf. Table 1).

** Insert Table 1 about here **

A comprehensive written questionnaire was used to ask the players about their sports, vocational and family careers. Since the interview covered a long period of their life course (13 to 18 years of age), some of the events had taken place a long time previously. For this reason, it was only possible to record data that were recalled sufficiently well (cf. Helsen, Starkes, & Hodges, 1998, for

example). The study received the approval of the Ethics Committee of the Faculty of Human Sciences at the University of Bern.

Operationalisation of operating factors

In studies based on a person-oriented approach, the first question to be asked is what operating factors are relevant for a (sub-)system. This question is crucial because it demarcates the limits of the (sub-)system based on theoretical considerations. In the following, the choice of the operating factors and the way they work will be justified theoretically and outlined.

In the interest of interpretability and reducing the system's complexity, the athletic, vocational and family careers are operationalised with one operating factor each: the conditions for promoting the sports career, as defined by the framework provided by a club (coaching activities, coach, infrastructure and talent promotion policy); the performance at school and, in the case of the post-school career phase, the level of the vocational training; and the (perceived) support through the family.

Conditions for promoting the sports career

The most important entity for promoting sports is the club. By deciding on the coaching activities, choosing the coaches, the available infrastructure and the talent promotion policy, the club creates the framework within which the promotion of athletic talents can take place. Hence the club plays a decisive role in all phases of a career. However, there are major problems associated with measuring these factors directly. The level of performance of a club's top team can, however, be used as an indirect measure of the degree of professionalization achieved by that club. The club's budget and hence the resources available for promoting young talents will be larger, the more successful the club's top team is.

School performance and level of vocational training

During a child's schooldays, school makes the highest cognitive demands on the child. Its cognitive powers are therefore a central resource for meeting those demands. Aside from this, school

performance is a limiting factor for the subsequent choice of a profession or vocational course of training. Thus the upper secondary level (primarily taught at Gymnasiums) makes high demands in terms of school performance, making it impossible for many pupils to get admitted to such institutions. A high cognitive capacity, as reflected by school performance, contributes favourably to the resource budget, on the one hand because it allows the effort required to fulfil school requirements to be minimised. On the other hand, it is the condition for being accepted into higher-level educational programmes, which in turn offer resource-friendly solutions for coordinating sports and vocational training.

Perceived family support

As has already been pointed out, families are as a rule the central source of support on various different levels (logistical, emotional or financial). In looking at the amount of support given, the focus lies on the support perceived by the players themselves, so that a possible over-involvement of the parents, which players may perceive as exercising pressure and therefore as being negative, must be taken into account.

The three operating factors described were operationalised as follows (cf. Table 2).

** Insert Table 2 about here **

The discrepancy in the number of subjects, compared with the original *n*=159, is a result of missing values: one subject displayed missing values in both phases, another in the second phase only.

The LICUR method

We have already pointed out the fundamental consequence of turning away from *GLM* in discussing the methodological implementation of the person-oriented approach. The LICUR method (**Li**nking of **C**l**u**sters after removal of a **R**esidue, cf. Bergman et al., 2003) is one possible methodological implementation, which is suitable for the explorative procedure used in the present study. The fundamental idea is to create groups (clusters) within a developmental phase, which contain subjects with similar levels of operating factors (patterns). Next, the individual transitions are determined, either from a cluster in one phase to another in the next phase, or else to a group

displaying a particular developmental outcome. By comparing the number of expected and actual transitions, transitions that are more frequent than expected (so-called developmental types) and those that are less frequent than expected (so-called developmental antitypes) can be identified (Bergman & El-Khouri, 2003). The LICUR method comprises three steps. Based on the concept of white spots (Bergman et al., 2003), a residual analysis is carried out. In this, extreme cases (residues) are identified and removed from the data set, since these would distort the cluster solution. They are later analysed separately. In the second step, clusters are formed for each phase (cluster analysis) and the subjects are assigned to these. In the final step, similarities between the patterns in different phases are examined, and in particular the transition frequencies of subjects between clusters, and thus the developmental (anti-)types. The first and third steps were done using the statistical package SLEIPNER 2.1 (Bergman & El-Khouri, 2002), the cluster analysis using IBM's SPSS Statistics 20.0.

Residual analysis

In residual analysis, the patterns displayed by the subjects are compared pairwise. A residue is identified as any subject not displaying similarities with at least a predetermined number of other subjects. To do so, in a first step a measure of the (dis-)similarity and a threshold value have to be decided on. The squared Euclidian distance was chosen as the measure of distance. There are no standard default levels for the threshold. Bergman et al. (2003) suggest, as a guideline, that the number of residues should not exceed 3% of the sample size. For the analysis, a threshold value of T=0.7 was chosen. In a second step, it must be decided how many similar cases should at least be observed in order for a pattern not to be considered a residue. Bergman et al. (2003) suggest this should be K=1 or K=2. For the present study, K=1 was chosen, meaning that only those subjects were excluded whose pattern was unique, so that they had no "twin". In the present study, two residues (#25 and #137) were identified in the first phase, and one (#154) in the second phase, which lies below the 3% limit and also makes sense in terms of the contents.

Cluster analysis

The Ward method, with the squared Euclidian distance as a measure of distance, was used for the cluster analysis, as recommended both in the literature for person-oriented approaches (Bergman et al., 2003; Trost & El-Khouri, 2008), and as a standard in most other applications of cluster analysis (Everitt, 2011). Deciding on the optimum cluster solution was guided by the cluster contents as well as statistical criteria. In terms of content, the highest priority was given to the criterion of interpretability, whereby the merging steps were strictly monitored and in each case analysed as to which clusters were to be merged in the next step on the basis of which features, so as to decide whether the interpretability of the new solution was improved. As a statistical criterion, the elbow criterion was chosen, as well as the Mojena test (Everitt, 2011) with a threshold value of 2.75 as the criterion. Furthermore, in each case the cluster solution with the lowest number of F scores >1 was found. The latter would imply that the dispersion of an operating factor within the cluster was larger than within the overall sample, which would contradict the underlying idea of a cluster analysis. The cluster solution found was then subjected to a cluster centre analysis, which allowed the error square sum (ESS) of the cluster solution to be reduced by relocating individual cases.

Developmental paths

In order to analyse the individual developmental paths, the number of transitions between the clusters in one phase and those in the next phase, or to a specific developmental outcome, were counted and checked for significant deviations compared with the expected number ($p<.05$) by means of a significance test based on the Fisher test and a hypergeometric distribution (Bergman & El-Khouri, 2003, p. 90). For this analysis, SLEIPNER offers the so-called Exacon module (Bergman & El-Khouri, 2002). Paths that occur more frequently than would be expected from random behaviour are described as developmental types; those which rarely occur are called developmental antitypes.

Structural stability

Structural stability (*SS*) refers to the similarity between the patterns for different phases. If patterns can be replicated in a similar form (i.e. if similar cluster centroids occur), this is described as reflecting a high structural stability. In order to analyse the structural stability, the average squared

Euclidean distance between clusters was compared. The clusters were arranged by pairs in order of increasing value, meaning that the most similar clusters are depicted alongside each other at the same level (cf. Figure 1). If a developmental type follows clusters with a high level of structural stability, the transition of this developmental type from one phase to the next can be said to be characterised by continuity.

Results

The cluster analysis was used to group the players according to the similarity of their patterns. The optimisation of the content-related and statistical criteria described led to a 5-cluster solution for both phases. Based on cluster centre analyses, these solutions are associated with explained ESS levels of 61.18% (first phase) and 67.49% (second phase), corresponding roughly to the 2/3 criterion (Bergman et al., 2003), which is therefore satisfactory. The low values of the cluster homogeneity coefficients (average square Euclidean distance within the clusters), lying between d=0.68 and d=1.25 (first phase) and between d=0.51 and d=1.01 (second phase) respectively, also speak in favour of the cluster solution found. In both cluster solutions, there are no F scores >1. With the help of SLEIPNER's Simulate module (Bergman & El-Khouri, 2002) the explained ESS of the two cluster solutions was compared with the average explained ESS of 20 random cluster solutions. The corresponding t-test for the first phase was significant (t(19)=5.52, p<.05, d=1.24), which speaks for the 5-cluster solution. In the second phase, there is no substantial difference between the ESS of the random solutions and of the 5-cluster solution (t(19)=0.68, p=.25, d=0.15), however here too all other criteria speak for the 5-cluster solution. Table 3 shows the descriptive statistics for the operating factors for each cluster in the two phases.

** Insert Table 3 about here **

It will be noticed that the assessment of school performance in the first phase is relatively high. Only one cluster has a mean below the theoretical average of three. This is even more extreme in the level of family support: here the mean is 4.49, on a scale of one to five, and the range is between 3.55 and 4.85. This reveals an extremely high perceived level of family support with regard to the

dedication to competitive sports during this stage in life, which is undoubtedly largely attributable to the specific sample (national youth team players). The situation is different when it comes to the conditions for promoting talents encountered in the clubs. In this phase, the players are often still members of smaller clubs with few programmes in place for professional promotion. Distinct differences are apparent between the clusters in this respect.

In the second phase, as expected, there are distinct differences in terms of the choice of profession and vocational training. The clusters have different scores and the overall variability is also relatively high. The perceived family support is still high, however the variability in this phase is somewhat higher, and one cluster (Cluster 2-2) now has a mean of “only” three. The players are now playing for distinctly more professional clubs, which is also as expected. This shows that many players appear to have switched clubs on moving from the Development to the Mastery phase.

Structural and individual stability

Before taking a closer look at the different developmental (anti-)types, in order to identify those patterns that are promising and those that are less promising, the clusters found will first be described and standardised based on their profile, the so-called cluster centroid (*z*-profile of the operating factors). Figure 1 gives an overview of all the clusters and the developmental (anti-)types.

In the first phase, Cluster 1-5 represents a widely observed pattern which is above average in terms of school performance and perceived family support. The conditions promoting sports talent, on the other hand, are below average. The least populous Cluster 1-2 is below average in terms of school performance and registers the least parental support. The pattern of Cluster 1-1 is likewise below average in terms of school performance, and in addition has below-average scores for talent promotion, as well as average family support. Cluster 1-4 appears to contain players who assess their school performance as being high, but give below-average values for family support. In terms of their commitment to sports, players in Cluster 1-3 receive the most support during this phase: they display above-average perceived parental support and are already in clubs with an above-average level of professionalism and correspondingly good conditions for talent promotion. In the second phase, Cluster 2-2 replicates Cluster 1-2 from the preceding phase. The cluster centroids are similar, whereby

the means of the operating factors two and three are even lower, on cross-sectional comparison. Cluster 2-2 is relatively small, with 11 players. Cluster 2-1 replicates Cluster 1-1, to which it displays a strong similarity (*SS*=0.11).

The clusters are arranged according to their structural stability. In other words, the topmost clusters are the two displaying the greatest similarity (Cluster 1-1 and Cluster 2-1), as reflected by the lowest squared Euclidian distance (cf. structural stability, *SS*). It turns out that four developmental types leading from the Development to the Mastery phase link similar clusters (Cluster 1-1 to 2-1, Cluster 1-2 to 2-2, Cluster 1-3 to 2-3 and Cluster 1-4 to 2-4). In other words, the transition between these developmental types is characterised by continuity, since the subjects follow developmental paths for which the relationship between the operating factors does not change much. In this connection it should be pointed out that the similarity is determined by comparing the *z*-scores of the patterns. It is therefore possible for the absolute scores of the operating factors to change despite a high degree of structural stability. The latter can be deduced from the descriptive data, especially in terms of the third operating factor: the conditions for talent promotion in the clubs become distinctly more professional in the second phase (cf. Table 3). Conversely, family support becomes somewhat less important. Both findings conform perfectly well to theoretical considerations (Salmela, 1994). Two further developmental types are also found (from Cluster 1-2 to 2-4 and from Cluster 1-5 to 2-1), both of which are characterised particularly by changes in the first operating factor. The first describes a type of player who achieved a high level of education despite a relatively low assessment of his school performance, while at the same time receiving less parental support than average and less promotion within his club. The second follows the opposite path concerning the first operating factor, while receiving above-average parental support and below-average promotion in sports.

All four observable developmental antitypes from the Development to the Mastery phase connect two dissimilar clusters. Two of these antitypes display no transitions, in other words no players followed those developmental paths. It is therefore comparatively unusual for the path from the Development to the Mastery phase to be associated with profound changes in the corresponding operating factors.

Two development types are observed leading from the Mastery phase to the level of performance in adulthood (22 years old): one goes from Cluster 2-4 to the lowest level of performance, and a second from Cluster 2-5 to the second highest level of performance. In terms of promoting and developing young talents, one is particularly interested in the transitions into the highest level of performance: the most common transitions to this group come from Cluster 2-3, although the observed number (n=10) does not deviate significantly from the expected value (n=7.8) if a uniform distribution is assumed (p=.22).

** Insert Figure 1 about here **

Analysis of the residues

The residues are characterised by the uniqueness of their patterns, and therefore lie on the boundary between observable and non-existent patterns (so-called white spots). In terms of developing young talents, it is precisely these cases that are particularly important, since expertise may come about through unique patterns. As has already been mentioned, two residues were identified in the first phase (#25 and #137) und one in the second phase (#154). Figure 2 provides an overview of the patterns (in the form of z-score profiles) of the three residues and the level of performance they achieved in adulthood.

** Insert Figure 2 about here **

Interestingly, all three residues are characterised by one or several operating factors lying substantially below the average level. In this analysis, too, from the point of view of promoting young talent, those individuals are of particular interest who made it right to the very top, which applies only to Residue #154. Atypically, this player's z-score profile displays below-average scores and a score that lies well below average in terms of the conditions for talent promotion encountered in the club during the Mastery phase (z=-3.73).

Discussion

This paper has taken a person-oriented perspective and attempted to measure and describe the development of young football talents during the period of transition from the Development to the Mastery phase holistically, i.e. taking into account different areas of life. In doing so, it has focused on the parallelism and resulting tension between athletic success and vocational education. Three operating factors were included in the analysis, one each from the sports, vocational and family career. In both phases, five patterns were identified. The analysis took place in five steps: First the patterns in each phase were determined and described. Second, the structural stability was analysed, i.e. the question whether the patterns reproduced in the later phase are similar to those seen in the preceding phase. The third step studied individual stability, in other words it answered the question which developmental paths are followed by individual players, and which paths are particularly common or rare. Fourthly, the patterns in the Mastery Phase were compared with the level of performance in adulthood, and finally, in the fifth step, the patterns of the residues were analysed.

Five patterns were identified in both developmental phases. In terms of the second question, the results can be summarised as demonstrating a relatively high level of structural stability. The patterns observed in the first phase are similar to those in the second phase. This finding can be carried over to the third question. Four so-called developmental types are seen, occurring between similar, structurally stable clusters. It would seem that the transition from the Development to the Mastery phase is typically characterised by stability, with major changes being comparatively rare. Two further developmental types also link comparatively similar clusters, whereas conversely the developmental antitypes are found between dissimilar clusters, quite often without any observable transitions. It follows that the transition as a whole is characterised by stability on the structural and individual level. In the fourth step, the same procedure was used to analyse the patterns leading from the Mastery phase to different levels of performance in adulthood. Two developmental types were identified: one leading to the lowest (2-4), and one to the second highest level of performance (2-5). The pattern seen in Cluster 2-4 is not very promising. Players who choose a demanding education, receive below average family support for their commitment to sports, and in addition have below-average conditions for talent promotion in their clubs, move to the lowest group of adult performance at an above-random

rate. One developmental path leads from the similar Cluster 1-4 in the Development phase to precisely this Cluster 2-4. This combination of operating factors therefore appears to be an inauspicious starting point for later expertise. If, on the other hand, only one of these two factors, “Family Support” or “Conditions for Talent Promotion in the Club”, is below average (e.g. Cluster 2-1), the resulting developmental type does not lead to a later development outcome. These findings emerge from the holistic analysis using a person-oriented approach, which provides clear additional benefits over variable-centred approaches.

In terms of promoting young talents, the paths to the highest level of performance are of particular interest. Most of these transitions come from Cluster 2-3, which is characterised by a below-average level of education, average family support and above-average promotion within the club. Compared with Cluster 2-5 (developmental type leading to players at top national level), this differs with regard to the choice of profession: players in Cluster 2-3 undergo vocational training resulting in lower educational certificates.

In terms of the fifth question, the residual analysis identified three residues. All three are typified by at least one operating factor that is very much below the average level. In terms of promoting young talents, the residue (case #154) who later achieved the highest level of performance in adulthood despite – or because of – his uniqueness, is particularly interesting. However, his *z*-score profile is not as expected and does not conform to theory: the player has negative *z*-scores on all operating factors, and is even very much below average in terms of the conditions for talent promotion. Here too, a causal interpretation is impossible. Presumably, this player was able to make up for a theoretically unfavourable pattern of circumstances through other subsystems that are not discussed in this paper (e.g. motor or mental skills).

Overall, the results can be interpreted as suggesting that stability is a structural feature of the transition from the Development to the Mastery phase. The described patterns of the sports, vocational and family careers already take on a stable form at an early stage and hardly changes during the course of development. Thus, for example, the constellation of players with a rather weak school performance and below-average family support (Clusters 1-2 and 2-2) only changes slightly. It is conceivable that

family support, in particular, would change favourably as a result of a player being nominated for the national team, but apparently this rarely happens. The patterns remain stable over time. The results do not provide a clear answer to the question which patterns are particularly successful. One pattern does emerge that displays above-average scores on all operating factors. These are players who receive professional sports promotion, who are supported well by their families and who mainly pursue higher educational programmes. However this development path leads only to the second highest rather than the highest level of adult performance. Most of the transitions to the most successful group of players come from a similar pattern, which is however below average in terms of its members' educational career. When professional sports promotion is available as well as strong family support, sports success is therefore most likely to occur when no higher educational certificates are being pursued at the same time. It can however also be said that visiting higher-level educational institutions while receiving below-average family support and below-average professional sponsorship, scarcely leads to success in football (Cluster 2-4). However it must be noted that individual players from all the clusters succeeded in reaching the topmost level. This is to be expected, since numerous other, exogenous and endogenous factors influence the development process. Unfavourable patterns (such as 2-4) can potentially be compensated for by other factors or subsystems not investigated here.

In principle, the explorative method used in the present study does not allow causal interpretations to be made. For example it is not possible to say whether the players in the fairly unpromising Cluster 2-4 were impaired in their sports development by a potential lack of support and by the high demands made by their vocational training, or whether there were already early signs that they would not have a breakthrough in sports. A generalisation of the findings to other sports and other countries must be viewed critically since the system of sports promotion is specific to the individual sport, and the educational system is shaped by national legislation.

The retrospective data collection and reconstruction of the individual life courses and the smoothing of one's own story, which is associated with this procedure, means that the reliability of the variables assessed in the interview must be viewed rather critically. At this point, prospective study designs would be preferable, in view of the higher accuracy of their measurements, which would in

turn permit different, more accurate operationalisations. It also stands to reason that a single variable cannot cover an entire area of a person's life. From a methodological point of view, any number of other (theoretically justifiable) operating factors could be adopted into the model. However interpreting the patterns in terms of their contents becomes much more difficult as the number of factors increases. One option would be to describe a subsystem within a single area of life, which would be a justifiable approach from a theoretical perspective (cf. Zibung & Conzelmann, 2013, for example). However the idea of the present paper was specifically to do justice to person-orientation in a holistic sense, in as far as possible, and to combine and represent various different areas of life within a single analysis. The trade-off for this method lies in the precision of the operationalisation of the different areas of life.

In conclusion it can be said that the person-oriented approach and its methodological implementation using pattern analyses has proved to be profitable in examining the current question. By assigning the players to certain types, a holistic picture of them emerges which is able – better than variable-centred approaches – to demonstrate means of compensation within the structure of relevant developmental factors (within the different patterns). Furthermore, the person-oriented approach takes into account the dynamic and non-linear character of talent development (cf. for example Abbott et al., 2005; MacNamara et al., 2011). Thus this approach, which is as yet new, at least in the field of talent research, seems to be fruitful for further, also hypothesis-testing, research.

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697

698

699 Table 1
700 *Description and distribution of the four levels of adult performance*

Short Description	Description	Definition	Frequency	Percentage
Level 1	*Players at international level*	SL with more than 20 games for NYT U19 to U21 and NT-A	24	15.1
Level 2	*Players at top national level*	SL with up to 20 games for NYT U19 to U21	42	26.4
Level 3	*Players at national level*	CL and SL with no games for NYT U19 to U21	59	37.1
Level 4	*Players at regional level*	First league or below	34	21.4
Total			159	100.0

701 SL = Super League; NYT = National Youth Team; NT-A = National Team A; CL = Challenge League
702

703

Table 2

Operationalisation of operating factors

Operating factor	Phase	Operationalisation	*n*	*M*	*SD*
1) School performance and level of vocational training	13-15 years old	Assessment of school performance compared with fellow students, from 1=poor student to 5=good student	158	3.84	0.81
	16-18 years old	Level of professional training after nine obligatory years of school attendance: 0=no training, 1= apprenticeship, 2=trade/vocational school, 3=secondary school	157	1.77	0.99
2) Perceived family support	13-15 years old	Mean of support from parents and siblings (in each case from 1=strongly impeded to 5=strongly supported), whereby parental support received double weight. If no siblings present, missing value was replaced by a (neutral). score of 3	158	4.46	0.57
	16-18 years old	Same operationalisation as for 13-15 years old	157	4.41	0.66
3) Conditions promoting sports career	13-15 years old	Mean standard of club's first team for 13, 14 and 15-year-olds; where 1=3rd league or lower, 2=2nd & 1st league, 3=Challenge League, 4=Super League	158	2.85	0.87
	16-18 years old	Same operationalisation as for 13-15 years old	157	3.40	0.67

Table 3

Descriptive statistics of operating factors

Development phase (13-15 years old)	Operating Factors					
	School Performance (Range 1-5)		Family Support (Range 1-5)		Conditions in Club for Promoting Talents (Range 1-4)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Total	3.84	0.82	4.49	0.53	2.87	0.86
Cluster 1-1 (*n*=27)	2.93	0.27	4.54	0.36	2.06	0.56
Cluster 1-2 (*n*=20)	3.30	0.80	3.55	0.33	2.88	0.61
Cluster 1-3 (*n*=40)	3.68	0.66	4.83	0.26	3.77	0.36
Cluster 1-4 (*n*=30)	4.63	0.49	4.13	0.29	3.16	0.60
Cluster 1-5 (*n*=39)	4.31	0.47	4.85	0.23	2.27	0.68
Mastery phase (16-18 years old)	Level of Professional Training (Range 1-5)		Family Support (Range 1-5)		Conditions in Club for Promoting Talents (Range 1-4)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Total	1.78	0.99	4.41	0.66	3.42	0.65
Cluster 2-1 (*n*=31)	1.06	0.68	4.72	0.30	2.67	0.48
Cluster 2-2 (*n*=11)	1.00	0.45	3.00	0.58	3.06	0.47
Cluster 2-3 (*n*=51)	1.04	0.34	4.55	0.51	3.95	0.14
Cluster 2-4 (*n*=25)	2.80	0.41	3.80	0.40	3.04	0.60
Cluster 2-5 (*n*=38)	2.89	0.31	4.80	0.30	3.68	0.44

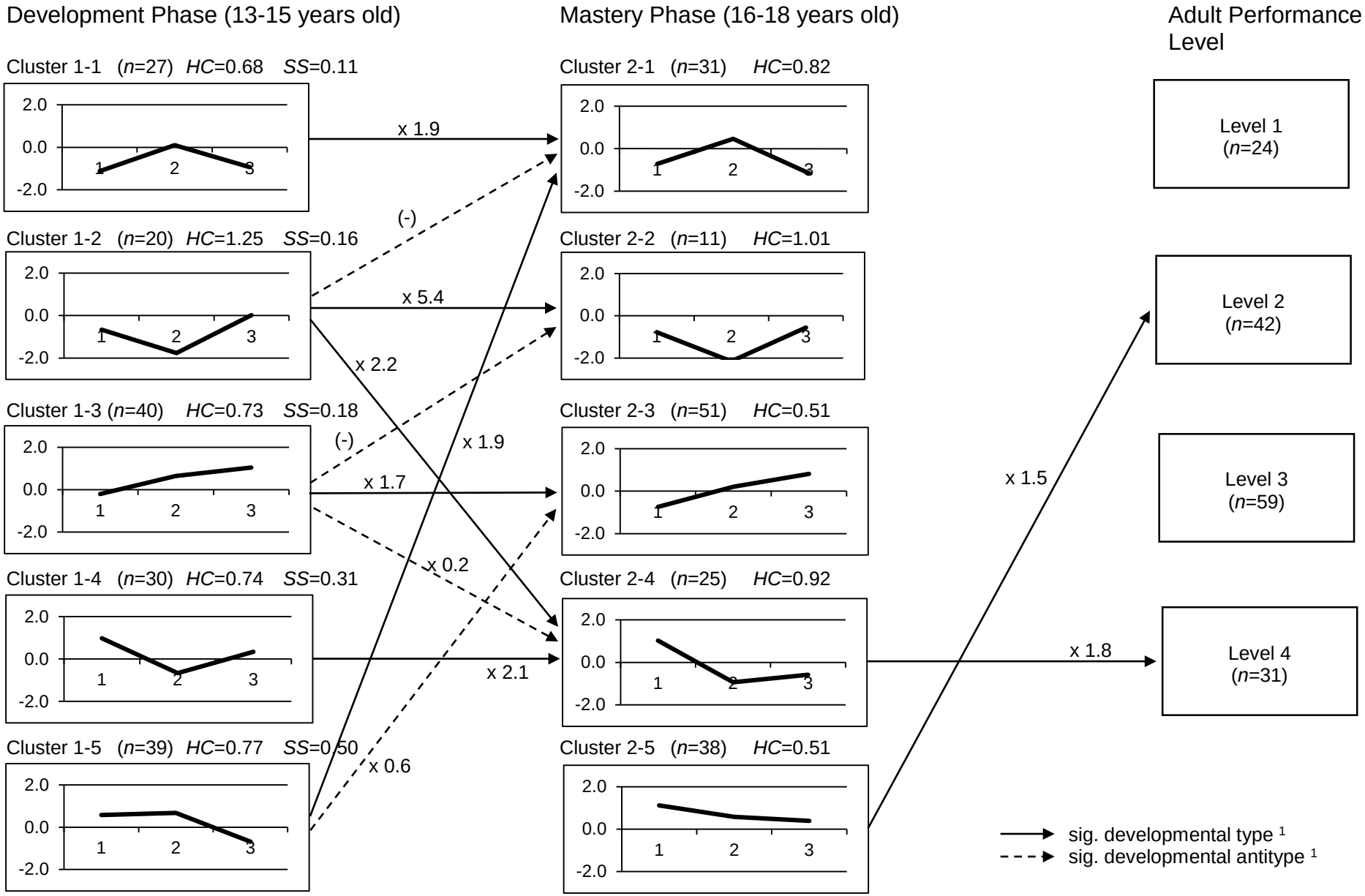
In assigning numbers to the clusters, the first digit refers to the phase (1 for Development and 2 for Mastery phase) and the number after the hyphen numbers the clusters within a phase from 1 to 5.

[Figure1.xps]

Figure 1. *z*-score profiles of the clusters (cluster centroids) and developmental (anti-)types for Mastery phase and for adult level of performance

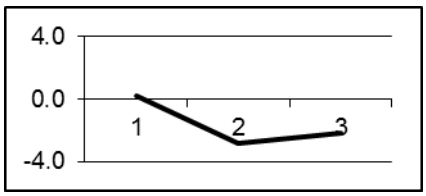
[Figure2.xps]

Figure 2. *z*-score profiles of the residues, stating adult level of performance

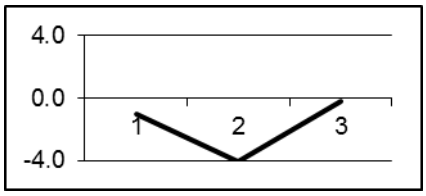

Development Phase (13-15 years old)
Mastery Phase (16-18 years old)
Adult Performance Level
Cluster 1-1 (n=27) HC=0.68 SS=0.11
Cluster 1-2 (n=20) HC=1.25 SS=0.16
Cluster 1-3 (n=40) HC=0.73 SS=0.18
Cluster 1-4 (n=30) HC=0.74 SS=0.31
Cluster 1-5 (n=39) HC=0.77 SS=0.50
Cluster 2-1 (n=31) HC=0.82
Cluster 2-2 (n=11) HC=1.01
Cluster 2-3 (n=51) HC=0.51
Cluster 2-4 (n=25) HC=0.92
Cluster 2-5 (n=38) HC=0.51
2.0
0.0
-2.0
1
2
3
x 1.9
(-)
x 5.4
x 2.2
(-)
x 1.9
x 1.7
x 0.2
x 2.1
x 0.6
x 1.5
x 1.8
Level 1 (n=24)
Level 2 (n=42)
Level 3 (n=59)
Level 4 (n=31)
sig. developmental type 1
sig. developmental antitype 1
Operating Factors:
1 = School performance
2 = Family support
3 = Conditions in club for promoting talent
HC = Homogeneity Coefficient
(average square Euclidian distance
within the cluster)
1 = Level of professional training
2 = Family support
3 = Conditions in club for promoting talent
SS = Structural Stability
(average square Euclidian distance
from twin cluster (= cluster at same height))
1 numbers refer the Odds ratios
(indicates the degree to which the probability
of this developmental path has increased
or decreased)
(-) = no transition

Development Phase

Residue #25 → Level 2



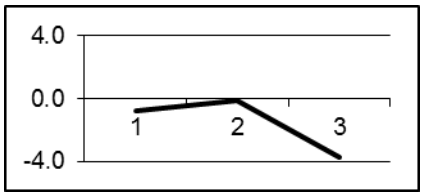
Residue #137 → Level 3



1 = School performance
2 = Family support
3 = Conditions in club for promoting talent

Mastery Phase

Residue #154 → Level 1



1 = Level of professional training
2 = Family support
3 = Conditions in club for promoting talent